

In re Patent Application of:
MORRISSETTE ET AL.
Serial No. 10/720,984
Filing Date: 11/24/03

REMARKS

Claims 1-14 remain in this application. Claims 15-22 have been cancelled. Claims 1 and 8 have been amended.

Applicants submit a Terminal Disclaimer to obviate the obviousness type double patenting rejection over claims 1-28 of commonly assigned U.S. Patent No. 6,651,637.

Applicants thank the Examiner for the detailed study of the application and prior art. At the outset, the present continuation-in-part application is directed to an electronic ignition system using an electronic control module that uses a breakerless distributor, for example, a reluctor assembly having a reluctor rotated by a distributor shaft and generating a reluctor signal. The present invention is directed to an ignition system that includes an ignition coil and electronic control module (ECM) that generates a signal.

In accordance with the present invention, the ignition module has a reluctor input, a bypass signal input, an electronic spark timing (EST) input. A microprocessor generates a control signal to the ignition coil and switches ON and OFF the primary current and reduces duty cycle as applied to the control signal from the ignition module to the ignition coil. This ignition module of the present invention

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is a sophisticated device having a microprocessor that is operative in a reluctor mode for outputting a control signal based on the reluctor signal received at the reluctor input, and a bypass mode, in which the control signal follows the electronic spark timing signal input. The microprocessor is operative with the various reluctor inputs, bypass signal input and electronic spark timing (EST) input to operate and control the different modes and resulting duty cycle of the system. In one aspect of the present invention, this sophisticated ignition module includes a temperature sensing circuit operative with the microprocessor for establishing a temperature control signal that is linear with the temperature change in the ignition module. The present invention is also operative to determine when an engine threshold has been exceeded by sensed processed engine operating parameters.

The Examiner has rejected all claims as anticipated by one of U.S. Patent Nos. 5,664,550 to Ito et al. (hereinafter "Ito") or 5,967,128 to Onuki et al. (hereinafter "Onuki"). Applicants note that both Ito and Onuki concern similar devices and are both commonly assigned to Hitachi, Ltd. and Hitachi Car Engineering Co. and relate to ignition circuits that can be formed on a single chip, including a thermal shut-off circuit. An IGBT is controlled by a current

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restriction circuit that includes a control transistor for performing ON/OFF operation of the IGBT.

Onuki is specifically directed to solving the problem of using an IGBT as a switching element to prevent primary current of the ignition coil and collective voltage of the IGBT from jumping (or swinging) when the current flowing through the IGBT is ready to be saturated.

Ito provides a self-diagnostic ignition system that can prevent re-energizing during the ON state of ignition control signal. The ignition circuit is formed on one chip and integrates an insulated gate bipolar transistor (IGBT) for controlling the closing and opening of the primary current circuit. The current limiting circuit limits the current flowing into the transistor. A thermal shut-off circuit forcibly shuts off the primary current in case of trouble.

The present claimed invention, on the other hand, is directed to an ignition system that includes a distributor and reluctor assembly that generates a reluctor signal. This ignition module uses a sophisticated microprocessor in the circuit, which includes a reluctor input, bypass signal input, and electronic spark timing (EST) input. The microprocessor is operative with the inputs and other circuits. The ignition module is operative in a reluctor mode for outputting a

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Serial No. 10/720,984
Filing Date: 11/24/03

control signal based on the reluctor signal received at the reluctor input. These signals can be processed by the microprocessor based on temperature or engine threshold. The circuit is also operative based on a bypass mode, in which the control signal follows the electronic spark timing signal input.

There is no disclosure or suggestion in Ito or Onuki for an ignition module that not only operates with the distributor and reluctor assembly in a reluctor mode, but also operates in a bypass mode as described above.

Ito and Onuki at most suggest one integrated circuit having a current limiting and detecting circuit operable with a latching circuit and temperature detecting circuit for permitting current switching limiting functions. At most, Ito and Onuki suggest four external terminals that reduce the effect of ground current variation at the time of primary current ON/OFF operation of the coil by dividing the ground into the ignition control signal negative terminal and power ground and detect a short circuit and open circuit at the ignition control signal positive terminal.

Ito and Onuki neither singularly nor in combination disclose or suggest the claimed electronic control module, distributor, and the ignition module of the present invention,

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Serial No. 10/720,984
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which receives the retractor, electronic spark timing (EST) and bypass signal inputs based upon sensed functions and microprocessing capability. This ignition module of the present invention can be operative in a retractor mode or the bypass mode for following the electronic spark timing signal input.

These bypass and retractor modes are clearly described on pages 19, starting at line 17, and continuing through page 22, ending at line 33. The described interface circuit is functionally operative with P+ and P- inputs from the retractor assembly. The EST input can be high and the retractor input could be low or open. This circuit is operable in an OR logic operation. The interface circuit could be a retractor to digital conversion circuit and operable with the microprocessor.

Applicants contend that the present case is in condition for allowance and respectfully requests that the Examiner issue a Notice of Allowance and Issue Fee Due.

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MORRISSETTE ET AL.
Serial No. 10/720,984
Filing Date: 11/24/03



If the Examiner has any questions or suggestions for placing this case in condition for allowance, the undersigned attorney would appreciate a telephone call.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Richard K. Warther", written over a horizontal line.

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: **MAIL STOP AMENDMENT, COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450**, on this 20th day of October, 2004.

A handwritten signature in cursive script, appearing to read "Julie Lalon", written over a horizontal line.